

What is claimed is:

1. An apparatus for delivering microorganisms to an environment to be treated, comprising:  
a bioreactor comprising an output tube to the environment to be treated;  
a nutrient container comprising a mixture of inorganic and organic nutrients;  
a nutrient pumping means for pumping inorganic and organic nutrients from the nutrient container to the bioreactor, the nutrient pumping means is in fluid communication with the nutrient container and the bioreactor; and  
a water pumping means for pumping water into the bioreactor, the water pumping means is in fluid communication with the bioreactor and a water source wherein the water pumped into the bioreactor displaces fluid out of the output tube of the bioreactor to the environment to be treated.
2. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, further comprising a reservoir in fluid communication with the water source and the water pumping means wherein the water pumping means pumps water from the reservoir to the bioreactor.
3. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, further comprising a controller comprising a programmable memory and an actuator, the controller being in communication with the nutrient and water pumping means wherein the actuator activates the nutrient and water pumping means according to a predetermined schedule stored in the programmable memory of the controller.

4. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, further comprising a heater means for heating the bioreactor.

5. An apparatus for delivering activated microorganisms to an environment to be treated according to claim 4, wherein the heater means maintains a temperature in the bioreactor of about 40°F to about 120°F.

6. An apparatus for delivering microorganisms to an environment to be treated according to claim 5, wherein the heater means maintains a temperature in the bioreactor of about 70°F to about 100°F.

7. An apparatus for delivering microorganisms to an environment to be treated according to claim 6, wherein the mixture of inorganic and organic nutrients in the nutrient container is in liquid form.

8. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, wherein the nutrient pumping means and the water pumping means operate independently.

9. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, wherein the nutrient pumping means is a pneumatic pump.

10. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, wherein the water pumping is a pneumatic pump.

11. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, wherein the nutrient container is a hopper containing a dry mixture of inorganic and organic nutrients and is in communication with the nutrient pumping means and the bioreactor.

12. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, wherein the bioreactor comprises a cell density sensor for measuring the concentration of microorganisms in the bioreactor.

13. An apparatus for delivering microorganisms to an environment to be treated according to claim 12, wherein the cell density sensor is a spectrophotometer.

14. An apparatus for delivering microorganisms to an environment to be treated according to claim 12, wherein the cell density sensor is a conductivity meter.

15. An apparatus for delivering microorganisms to an environment to be treated according to claim 1, further comprising an overflow tube.

16. An apparatus for delivering microorganisms to an environment to be treated, comprising:  
a bioreactor comprising an output tube to the environment to be treated;  
a nutrient container comprising a mixture of inorganic and organic nutrients;  
a nutrient pumping means for pumping inorganic and organic nutrients from the nutrient container to the bioreactor, the nutrient pumping means is in fluid communication with the nutrient container and the bioreactor; and  
a solenoid in fluid communication with the water supply and the bioreactor, the solenoid having an open and closed position wherein water flows into the bioreactor when the solenoid is in the open position and water is prevented from entering into the bioreactor when the solenoid is in the closed position.

17. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, further comprising a reservoir, said reservoir in fluid communication with the water supply and the bioreactor wherein water enters the reservoir and flows to the bioreactor when a predetermined level is reached.

18. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, further comprising a controller comprising a programmable memory and an actuator, said controller being in communication with the solenoid and the nutrient pumping means wherein the actuator activates the solenoid and nutrient pumping means according to a predetermined schedule stored in the programmable memory of the controller.

19. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, further comprising a heater means for heating the bioreactor.

20. An apparatus for delivering activated microorganisms to an environment to be treated according to claim 19 wherein the heater means maintains a temperature in the bioreactor chamber of about 40°F to about 120°F.

21. An apparatus for delivering microorganisms to an environment to be treated according to claim 19, wherein the heater means maintains a temperature in the bioreactor chamber of about 70°F to about 100°F.

22. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, wherein the inorganic and organic nutrients are in liquid form.

23. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, wherein the nutrient pumping means and solenoid are independent.

24. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, wherein the nutrient pumping means is a pneumatic pump.

25. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, wherein the nutrient container is a hopper containing a dry mixture of inorganic and organic nutrients and is in communication with the nutrient pumping means.

26. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, wherein the bioreactor comprises a cell density sensor for measuring the concentration of microorganisms in the bioreactor.

27. An apparatus for delivering microorganisms to an environment to be treated according to claim 26, wherein the cell density sensor is a spectrophotometer.

28. An apparatus for delivering microorganisms to an environment to be treated according to claim 26, wherein the cell density sensor is a conductivity meter.

29. An apparatus for delivering microorganisms to an environment to be treated according to claim 16, further comprising an overflow tube.

30. A method for the biological treatment of an environment to be treated comprising:  
continuously dosing a bacterial composition from an apparatus for delivering microorganisms to an environment to be treated.

31. A method for the biological treatment of an environment to be treated according to claim 30 wherein the apparatus comprises:

a bioreactor comprising an output tube to the environment to be treated;

a nutrient container comprising a mixture of inorganic and organic nutrients;

a nutrient pumping means for pumping inorganic and organic nutrients from the nutrient container to the bioreactor, the nutrient pumping means is in fluid communication with the nutrient container and the bioreactor; and

a water pumping means for pumping water into the bioreactor, the water pumping means is in fluid communication with the bioreactor and a water source wherein the water pumped into the bioreactor displaces fluid out of the output tube of the bioreactor to the environment to be treated.

31. A method for the biological treatment of an environment to be treated according to claim 31 wherein the apparatus further comprises a reservoir in fluid communication with the water source and the water pumping means wherein the nutrient pumping means pumps water from the reservoir to the bioreactor.

32. A method for the biological treatment of an environment to be treated according to claim 31 wherein the apparatus further comprises a controller comprising a controller comprising a programmable memory and an actuator, the controller being in communication with the nutrient and water pumping means wherein the actuator activates the nutrient and water pumping means according to a predetermined schedule stored in the programmable memory of the controller.

33. A method for the biological treatment of an environment to be treated according to claim 30

wherein the apparatus comprises:

a bioreactor comprising an output tube to the environment to be treated;

a nutrient container comprising a mixture of inorganic and organic nutrients;

a nutrient pumping means for pumping inorganic and organic nutrients from the nutrient container to the bioreactor, the nutrient pumping means is in fluid communication with the nutrient container and

the bioreactor; and

a solenoid in fluid communication with the water supply and the bioreactor, the solenoid having an open and closed position wherein water flows into the bioreactor when the solenoid is in the open position and water is prevented from entering into the bioreactor when the solenoid is in the closed position.

34. A method for the biological treatment of an environment to be treated according to claim 31

wherein the apparatus further comprises a reservoir, said reservoir in fluid communication with the water supply and the bioreactor wherein water enters the reservoir and flows to the bioreactor once a predetermined level is reached.

35. A method for the biological treatment of an environment to be treated according to claim 31

wherein the apparatus further comprises a controller comprising a programmable memory and an

actuator, the controller being in communication with the solenoid and the nutrient pumping means

wherein the actuator activates the solenoid and nutrient pumping means according to a predetermined schedule stored in the programmable memory of the controller.



36. A composition comprising:

metal-oleate, and trace elements.

37. A composition according claim 36 wherein the trace elements are selected from the group consisting essentially of  $\text{MgSO}_4$ ,  $\text{CaCl}_2$ ,  $\text{Na}_2\text{HPO}_4$ , ferric NH citrate,  $\text{KHCO}_3$ ,  $\text{NaCl}$ , Dextrose, Citrate, Yeast Extract, Whey Extract,  $\text{NH}_4\text{NO}_3$ ,  $\text{NH}_4\text{Cl}$ ,  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ ,  $\text{CuSO}_4$ ,  $\text{Na}_2\text{EDTA}$ , Molybolic Acid,  $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$ ,  $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ , Vitamin A, Vitamin D, Vitamin E, Vitamin K, Thiamin, Riboflavin, Niacin, Vitamin B<sub>6</sub>, Folic Acid, Vitamin B<sub>12</sub>, Biotin, Pantothenic Acid, Calcium, Iron, Phosphorous, Iodine, Magnesium, Zinc, Selenium, Copper, Mn, chromium, Molybdenum, Chloride, potassium, Boron, Nickel, Silicon, Tin and Vanadium.

38. A composition according to claim 36 wherein the pH is between about 10 and about 12.

39. A composition according to claim 36 wherein the composition comprises about 50 to about 60 weight percent of water;

about 20 to about 30 weight percent K-oleate;

about 2 to about 3 weight percent glycerin;

about 9 to about 11 weight percent of vegetable oil; and less than a bout 1 weight percent of the

compounds selected from the group consisting essentially of  $\text{MgSO}_4$ ,  $\text{CaCl}_2$ ,  $\text{Na}_2\text{HPO}_4 \cdot \text{H}_2\text{O}$ ,  $\text{NaCl}$ ,

Dextrose, Citrate, Yeast Extract, Whey Extract, Trace elements, Sodium EDTA, Keltrol, Ferric

Ammonium Citrate,  $\text{NaOH}$ ,  $\text{NH}_4\text{NO}_3$ ,  $\text{NH}_4\text{Cl}$ , Tween 20, Tween 80, and Simethlycone.

40. A composition according to claim 26 wherein the vegetable oil is a mixture of about 4 to about 5 weight percent corn oil and about 5 to about 6 weight percent canola oil.

2004056 01000